

Section 103 Rejections

Tonkovich in view of Hammel

Claims 1, 2, 5 – 9, and 14 – 18 are currently rejected under 35 U.S.C. § 103(a) as being unpatentable for obviousness over Tonkovich, et al (WO 01/12312) in view of Hammel, et al (applicants presume U.S. Patent No. 3,843,341 is intended here). This rejection is respectfully traversed.

Claim 1 as currently pending recites

A microstructure for chemical processing and manufacturing comprising a plurality of microchannel walls defining at least one microchannel for accommodating chemicals to be processed, at least one coating layer adhered to the plurality of microchannel walls defining said at least one microchannel, the coating layer including a catalyst support and a catalyst, wherein the plurality of microchannel walls comprise a frit of a material selected from the group consisting of glass and glass-ceramic, and combinations thereof.

As best understood, in reading the above claim on the disclosure of Tonkovich, the Examiner reads the claim recitation “a plurality of microchannel walls defining at least one microchannel” on the “porous material 106” of Tonkovich. In particular embodiments, such as that shown in Fig. 3 of Tonkovich, porous material 106 indeed forms such a plurality of walls. In other embodiments, porous material 106 does not. For example, in the embodiment of Figures 4a and 4b, porous material 106 is adjacent to walls 400, and may be removable (page 9 lines 8-9).

As further best understood, in further reading the above claim on the disclosure of Tonkovich, the Examiner reads the claim recitation “at least one coating layer adhered to the plurality of microchannel walls” on “porous material 600 acting as a support for catalyst 108.” (Page 3 of the Action, top paragraph)

Applicants respectfully note that Tonkovich does not disclose porous material 600 as adhered to a microchannel wall, as the Examiner suggests, but rather as residing on a “porosity surface area 202” inside the pores of porous material 106, or in other words, adhered to the walls of the pores in the porous material 106, rather than to the walls of the microchannels. As far as applicants are aware, nowhere in Tonkovich is the material 600 shown or discussed as being adhered to the walls of a microchannel.

For at least this reason, claim 1 and the claims depending from it are believed to be allowable over Tonkovich and Hammel.

Applicants also respectfully traverse the equivalence drawn by the Examiner, in interpreting Hammel, between glass frit and microporous glass. As noted in the previous response, these are not the same. Glass frit is glass powder produced by grinding or milling or similar processes. Microporous glass is glass with a microporous structure. These are non-equivalent terms, yet the rejection maintains equivalence of these terms.

Claim 1 recites “microchannel walls comprise[ed of] a frit of a material selected from the group consisting of glass and glass-ceramic, and combinations thereof.” The Examiner cites Hammel as making it obvious to select glass frit to form porous material 106 of Tonkovich. Assuming for purposes of argument that claim 1 is otherwise readable on Tonkovich, the applicants respectfully disagree.

First, although Hammel does disclose a use of frit, as noted by the Examiner in response to the previous arguments, Hammel uses frit only as a way of forming the glass beads disclosed and described therein. Hammel does not disclose a single individual object or structure “comprised of a frit” as recited in the claim. This may be seen from the processes described in Hammel and referenced by the Examiner. The first section of Hammel quoted by the Examiner, with a little additional text from the next succeeding paragraph, reads:

After a glass of the above composition has been melted, the glass is particulated. Particulation can be achieved directly from the glass melt or can be achieved by first forming the glass into a shape-retaining article and then mechanically breaking it. Particle size can be controlled by crushing or grinding, followed by sieving the particles through standard mesh screens. Alternatively, the glass can be particulated by directly quenching the glass melt with a suitable fluid. Examples of suitable fluids include air and liquids, such as water and oils. If the glass particles are formed directly from the glass melt as described above, they are usually in bead form and no further shaping is necessary. However, if glass is particulated by mechanically breaking or direct quenching of the melt, further shaping or beading is necessary.

The beading operation consists of passing the irregularly shaped particles through an inclined rotating alumina lined tube furnace to spheroidize the particles putting them into bead form which is the most usable form for a catalyst support.

In other words, the disclosed beads may be formed in two ways, quenching in such manner as to form beads directly, or by quenching or solidifying the glass, then crushing, grinding, and sieving it, followed by heating in a rotating furnace to make the particles become spherical enough for beads. Even in the case where frit is produced as an intermediate stage to forming beads, no bead is “comprised of frit” that is, comprised of powdered glass. According to the described process, each bead is comprised of exactly one particle of the sieved glass. Thus there is no disclosure in Hammel of any structure “comprised of frit.” A single particle is not a frit.

Although, as noted by the Examiner, Hammel repeatedly refers to “articles” almost interchangeably with beads, applicants cannot discover any other article than a bead disclosed in Hammel, except the “article” mentioned in the above-quoted passage, which is formed from the glass melt, not from frit, then is ground into particles in order to form beads. Frit is disclosed in Hammel only as an intermediate to form beads, and Hammel has nothing to do with forming anything “comprised of frit,” only with reshaping individual ground glass particles of the proper size into beads.

Similarly, in the other passage cited by the Examiner, with a little of the following text added, Hammel states

The molten glass was particulated to a frit by blowing a cold stream of air on the glass as it was poured from the crucible. The frit was sieved, and the fraction passing through a No. 5 U. S. standard sieve and not through a No. 10 U.S. standard sieve was collected. The larger fragments collected on a No. 5 sieve were passed through a jaw crusher for very large particles and a roll crusher for smaller particles. Again, the fraction between the No. 5 and No. 10 sieve were collected. The particles collected from sieving (about 2 to 4 millimeters in size) were beaded to spherical shapes in an inclined rotating tube furnace Type 54233, manufactured by Lindbergh Company, a Division of Sola Basic Industries.

In other words, frit is formed as a part of the bead-making process only, not as a step toward making other “articles.” The frit is selected, by sieving, for the desired bead size, then rounded in a furnace. This disclosure does not and cannot teach or suggest forming the microchannel walls of microfluidic structures out of powdered glass, alone or in combination with any other reference of which applicants are aware. For this reason also, claims 1 and the claims depending from it are believed to be allowable over Tonkovich and Hammel.

Regarding the Examiner's response to the arguments previously raised by Applicants on these points, Applicants respectfully and specifically traverse the statements by the Examiner that

Hammel et al. states that the particulated glass or glass frit may be shaped, generally into "glass articles" (see column 1, lines 15-27). The bead is merely an exemplary shaping for the glass frit.

(Page 14 of the current Action.) These statements are no doubt well intentioned, but are nonetheless false. At the referenced text in column 1, lines 15-27, which is the Abstract, Hammel states merely that articles may be formed, having certain properties, and that the articles "in particle form, such as beads" are useful as catalyst supports. Hammel does not state or suggest, in the Abstract or elsewhere, "that ... glass frit may be shaped generally into 'glass articles.'" While the bead may arguably be an exemplary "article," the bead is not "merely an exemplary shaping for the glass frit." The bead is the reason for making the frit in the first place, and it is the only shaping of the frit even mentioned, and it is not a shaping of the frit as such anyway, but a shaping of individual particles first selected for their size.

As mentioned above, the sole "article" mentioned in Hammel that is not a "particle" or "bead" is a "shape-retaining article" formed directly from the glass melt (column 5, line 56), not from a frit. Hammel nowhere discusses or suggests forming articles "comprised of" glass powder.

As the above-quoted statements are incorrect, the conclusions based on them, namely that the claims at issue are obvious from Tonkovich in view of Hammel, are not valid.

Claus in view of Hammel

Claims 1, 2, 5 – 9, and 14 – 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable for obviousness over Claus, et al (Catalysis Today 67 (2001) 319-339) in view of Hammel, et al (U.S. Patent No. 3,843,341). As discussed above, although Hammel does disclose a use of frit, Hammel uses frit only as a way of forming glass beads, which beads are each formed of a single glass particle, rounded by heating and tumbling in a furnace. Hammel does not disclose a single individual object or structure

“comprised of a frit” as recited in claim 1. Accordingly, Hammel cannot supply the features recited in claim 1 absent from the Claus reference. For at least this reason, claim 1 and the claims depending from claim 1 are believed to be allowable over Claus in view of Hammel.

Double Patenting

The Examiner has provisionally rejected claims 1, 2, 5 – 9, and 14 – 18 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1 – 17 of co-pending Application No. 11,016,093. The Examiner has also provisionally rejected claims 1, 2, 5, 6, and 16 – 18 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1 – 13 of co-pending Application No. 11/016,645. These provisional rejections are acknowledged, but will be responded to later, at the latest at such point, if any, as they become non-provisional.

New Claims

New claims 26-29 have been added for consideration. Claim 26 is similar to claim 1 but with specific mention of “interior surfaces,” and of “consolidated fired” frit added. These characteristics or features are described in the specification and drawings, so no new material is believed to be added. See, for example, paragraphs 22 and 27 (where coatings are described as being on the interior or the interior surfaces of the microchannel) and paragraphs 45, 57, and 78 (where consolidation, firing, and sintering (a synonym) are mentioned or discussed), as well as the related figures. Claim 26 is believed allowable at least for the same reasons as claim 1.

The other new claims are also believed not to add new matter. New claim 27 finds support at least in paragraph 37 of the specification, for example. New claims 28 and 29 find support in the specification and in original claim 18.

Conclusion

Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form

Appl No.: 10/696,052
Response dated: July 18, 2008
Office Action dated: January 18, 2008

and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that a three month extension of time is necessary to make this Reply and accompanying RCE timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Gregory V. Bean at 607-974-2698.

DATE: July 18, 2008

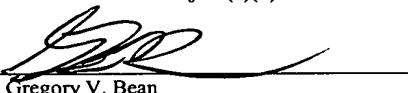
Respectfully submitted,



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